# Report of the June 2003 Meeting of the Astronomy and Physics Working Group

The Astronomy and Physics Working Group (APWG) met on June 16 and 17, 2003 at NASA Headquarters. The meeting was attended by Chris Blades, Steve Boggs, Ed Cheng, Marc Devlin, Kathryn Flanagan (co-chair), Dick Miller, Douglas Richstone (chair) Steve Ritz, Eun Suk Seo, Tuck Stebbins, Wilt Sanders, Ted Snow, Erik Wilkinson and Jonas Zmuidzinas. David Weinberg was unable to attend.

As always, we are tremendously impressed with the scope and vitality of the R&A and technology programs, and the grand sweep of endeavor supported by the Code S Astronomy and Physics division. We focus here on issues where we thought some improvement should be sought and might be achieved.

**Research and Analysis Program**

The APWG is very troubled by the funding trends for the Research and Analysis (R&A) program. The R&A program is a key source of the new scientific goals and technologies that ultimately lead to new mission concepts. Our view is that the R&A program represents a critical long-term investment that NASA Code S Astronomy and Physics Division (APD) must make in order to ensure its future. We did not see historical data, but the committee has the impression that R & A has declined significantly as a fraction of the Code S budget over the last 5 years.

The problem is particularly acute for The Astrophysical Theory Program that was slated for significant increases on the basis of a very high ranking in a senior review two years ago. Instead, it has declined significantly, although some theoretical work will be supported in the Beyond Einstein Foundation Science line.

This problem appears to be caused outside of Code S, and even outside NASA. We believe that the community needs to do a better job of explaining to OMB, OSTP and the NASA Administrator that:

1. R&A is the fuel that powers the scientific community (beyond NASA centers and contractors) to utilize the great observatories and facility class instruments to do great science,

2. The scientific activities funded through the R&A program, through data analysis and theory, play a critical role in setting the agenda for future missions, and

3. The technology development funded through SR&T is the seed corn for future missions.

We discussed several possible ways to try to do better in this area in the future. Three that might work (which have certainly occurred to others) are working harder to get R&A into the next agency-wide strategic plan including theory and R&A in each mission, and taxing the entire Code S budget at a fixed fraction for R&A as though it were infrastructure.

**Group Theory Proposals**

As discussed above APWG is concerned about the declining support for R&A, especially theory. Because of the decline in support for the theory program, the group proposals constitute large quanta that absorb very large fractions of the program and which are hard to review in a competition with the individual proposals. APWG believes that any special consideration for group proposals should be eliminated and they should not be specifically encouraged (or discouraged).

**Balloons**

The APWG reiterates its view that the Balloon Program should receive adequate funding to maintain its viability, both for current operations as well as for the development of future payloads. The APWG recognizes that the unanticipated requirement for NASA to build and upgrade long duration balloon (LDB) facilities in Antarctica imposes a significant burden. While improvements in these facilities are welcome, we are concerned that the associated reduction in the number of flight opportunities, required to release funds for these activities, will cause serious problems. The near term science output of the affected groups will be reduced. Delays could cause some missions to have significantly reduced scientific impact or to lose relevance entirely. The process of deciding which flights to delay should be clearly defined, and the resulting prioritization of flights should be peer-reviewed to ensure the optimization of scientific return. An additional effect of stretching out the balloon program is that the start of new payloads may well be delayed, adversely affecting NASA's longer-term (2005-2009) flight program. The APWG encourages NASA to secure additional funds to reduce the ripple effect of this significant, albeit temporary, reduction in balloon flight capacity.

**Technology Priorities**

The Committee is keenly interested in the interactions between Code S and Code R as they relate to technology development supporting Space Science missions. We commend the evolving responsiveness of Code R to the needs of Code S, notably their support for mid-range Technology Readiness Levels (TRLs of 4 to 6). This responsiveness has manifested itself in the solicitation of Code S recommendations for reviewers and in NRA's addressing Code S needs for Advanced Sensors and Instruments, Large Apertures, and Ultra-Low Power Electronics. We are delighted with the increasing fraction of the Code R funding in technology that is competed openly (with center and non-center proposers on an equal footing) and peer-reviewed. We are also pleased with Harley Thronson's successes in facilitating interactions between Code S divisions and Code R. We also note the Astronomy and Physics Division's intention to co-fund technology

development opportunities. We trust that these trends will continue under the next Code R management.

The Committee, however, remains concerned about the overall Code S model for technology development, and the Code R role in that model. Technology development is distributed over the R&A program, Centers, major missions, the New Millennium Program and other settings. We are concerned that we cannot readily see a cohesive plan that supports appropriate technology development through all TRLs that feeds the needs of SMEXs, MIDEXs and larger missions. Needed technology is often called out in various roadmap documents, but the path for its maturation and infusion into missions is less clear. The APWG would like to see the list of critical technologies that Code S forsees it will need in 15 years, and an explanation of the process for prioritizing technologies.

**The Mid-TRL Gap**

On previous occasions we have expressed concerns about the "TRL Gap", where technologies are developed to TRL 3, which leaves them low enough so that reliance on them will kill an Explorer proposal. We were told that Code S and Code R are now both prepared to fund TRL 3 to 6 development.

**Full Cost Accounting:**

The APWG is concerned about the potential effects of full cost accounting at NASA Centers on the effectiveness of the NASA R&A program.

The exact effects of the transition to full cost accounting are not clear, increasing the risk that scarce R&A funds currently going to NASA Centers will be diverted to paying for salaries and infrastructure costs that were not a part of the original budget. In addition, we see indications that the "passback" mechanism will not have budget-neutral effects. We are concerned that the funding available for critical scientific activities will be reduced.

Inefficiencies in the passback mechanism may also lead to a loss of critical technology at the Centers. Many of these technologies are essential for current and future projects. Care is required to prevent the transition from having unintended effects in this area.

**The ROSS Website**

The APWG believes that the ROSS web site, which is the primary information source for most proposers, should be simpler and easier to navigate. Helpful improvements would a search function that would permit the details of any particular program to be readily found by program name or science category. Other changes may be valuable as well. The APWG suggests that NASA and the web developers consult representatives of the astronomical community as the web site is modified. Members of our committee have offered to help in this way.

**SPIDR Cancellation**

Occasionally it may be necessary for NASA to consider canceling an Explorer mission prior to that mission's confirmation review, as was recently the case with the SPIDR SMEX mission. The APWG received a detailed presentation of the events that led to the termination of SPIDR and is satisfied that the process was careful, conscientious, and fair to both the SPIDR team and to its competitors.

**The Next Meeting**

The tentative date is Oct 20-21, at NASA HQ. The tentative and partial list of items to discuss is:

1. a history of the SR&T program, its metrics (i.e. successes/failures), a mapping of how the programs relate to each other;

2. a re-brief of the effects of full costing at the Centers and how that is affecting R&A;

3. report on the results (such as they are) for the ROSS03 solicitations with specific results for rocket and balloon research;

4. a list of the technologies for APD that have been prioritized for support for development either from within Code S or from Code R.